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IS 9000-13 (1981): Basic environmental testing procedures for electronic and electrical items, Part 13: Low air pressure test [LITD 1: Environmental Testing Procedure]



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IS : 9000 (Part XIII) - 1981

Indian Standard

**BASIC ENVIRONMENTAL TESTING
PROCEDURES FOR ELECTRONIC AND
ELECTRICAL ITEMS**

PART XIII LOW AIR PRESSURE TEST

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**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART XIII LOW AIR PRESSURE TEST

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BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART XIII LOW AIR PRESSURE TEST

0. FOREWORD

0.1 This Indian Standard (Part XIII) was adopted by the Indian Standards Institution on 19 June 1981, after the draft finalized by the Environmental Testing Procedures Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The differences in environmental testing procedures for component type items and equipment type items are fast disappearing in the context of technological developments. It is, therefore, felt necessary to have uniform testing procedures wherever possible. This series of standards on environmental testing procedures (IS : 9000) has been prepared with this objective. This is also in line with the principle adopted by IEC/TC 50 'Environmental Testing' in developing unified series of standards on environmental testing procedures by International Electrotechnical Commission.

0.2.1 It is proposed to withdraw the existing Indian Standards, namely, IS : 589-1961* and IS : 2106† series dealing with environmental tests for electronic components and equipment respectively, as soon as the tests mentioned therein are covered in the new series (IS : 9000).

0.3 In preparing this standard, assistance is derived from IEC Pub 68-2-13 (1966) 'Basic environmental testing procedures : Part 2 : Tests, Test M : Low air pressure', issued by the International Electrotechnical Commission.

0.4 In reporting the result of a test or analysis, made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960‡.

*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (revised).

†Environmental tests for electronic and electrical equipment.

‡Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard (Part XIII) deals with the test procedure for low air pressure test for electronic and electrical items as a part of basic environmental testing procedures.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions and explanation of terms given in IS : 9000 (Part I)-1977* shall apply.

3. OBJECT

3.1 The object of this test is to determine the suitability of items to operate under conditions of low pressure such as would be encountered at high altitudes.

4. DESCRIPTION OF TEST APPARATUS

4.1 The chamber for the test shall be capable of maintaining pressure to the appropriate severity as specified in 5.1.

4.2 It shall also be possible to maintain in any region where the items are placed, any of the temperatures specified in IS : 9000 (Part II)-1977† and IS : 9000 (Part III)-1977‡, or the temperature of the standard atmospheric conditions for testing, as may be required by the relevant specification.

5. SEVERITIES

5.1 The severities, as indicated by pressure shall be specified in the relevant specification. The values shall be selected from those given in Table 1.

6. PRECONDITIONING

6.1 The relevant specification may call for a preconditioning.

7. INITIAL MEASUREMENTS

7.1 The item shall be visually inspected and electrically and mechanically checked, as required by the relevant specification.

*Basic environmental testing procedures for electronic and electrical items: Part I General.

†Basic environmental testing procedures for electronic and electrical items: Part II Cold test.

‡Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test.

TABLE 1 SEVERITIES

(Clause 5.1)

Pressure kPa		Altitude m
0.15	} ± 5 percent or 0.1 kPa whichever is greater	46 000
1.0		31 000
2.0		26 000
4.4		20 000
7.2		18 300
8.5		16 000
11.5		15 200
15.0		13 200
30.0		8 500
46.5		6 100
53.3		4 300
60.0		3 500
70.0		2 200
84.0 ± 2.0		see Note 3

NOTE 1 — Altitudes up to 1000 m are covered by the standard air pressure of 86 to 106 kPa.

NOTE 2 — The pressure/altitude relationship in this table is not exact and is for information only.

NOTE 3 — Applicable when it is required to test items at the lower limit of the air pressure value of the standard atmospheric conditions for testing.

8. CONDITIONING

8.1 The item shall be introduced into the chamber; the pressure and temperature shall be adjusted to and maintained at the specified values for the period required by the relevant specification.

8.2 Where the relevant specification calls for low or high temperature, in addition to low pressure, temperature of the chamber shall be adjusted to the specified value and temperature stability reached before the pressure is reduced. The pressure and temperature values are later restored by admission of dry air at laboratory temperature or in the manner specified by the relevant specification.

Care shall be taken that no condensation shall occur on the items during their return to laboratory temperature in the testing chamber.

8.3 If required, the items shall be under load during the conditioning.

8.4 While still at low pressure, the items shall be measured and mechanically checked, as required by the relevant specification.

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8.5 If, when testing equipment, it is expected that this equipment may not operate normally at pressure values intermediate between the low pressure and the standard pressure, the equipment may remain switched on and be measured during the pressure restoration period.

9. RECOVERY

9.1 Components shall remain under standard atmospheric conditions for recovery for not less than 1 h nor more than 2 h.

9.2 Equipment shall remain under standard atmospheric conditions for testing for a period not less than that required to attain temperature stability. This procedure may take place in or outside the chamber. The relevant specification may, however, call for a specific recovery period for a given type of equipment.

10. FINAL MEASUREMENTS

10.1 The item shall be visually inspected and electrically and mechanically checked, as required by the relevant specification.

11. INFORMATION TO BE GIVEN IN THE RELEVANT SPECIFICATION

11.1 When this test is included in the relevant specification, the following details shall be given as far as they are applicable:

- a) Pre-conditioning procedure (*see 6*);
- b) Initial measurements (*see 7*);
- c) The appropriate severity (*see 5*);
- d) Required temperature (*see 8.1*);
- e) Duration of conditioning and loading during conditioning (*see 8.5*);
- f) Measurements and mechanical checks to be made during the conditioning and the time at which they shall be made (*see 8.4*);
- g) Final measurements (*see 10*); and
- h) Any deviation from the procedure for recovery.

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